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Citation

Prof. Virendra Kumar Vijay, IREDA chair professor at Centre for Rural Development and Technology at IIT Delhi is one of most acclaimed and internationally acknowledged Scientist in the area of rural technologies, biogas technology and biofuels.

Strengthening the link between higher education institutes and rural India, Prof. Vijay and his team developed the concept and vision of **Unnat Bharat Abhiyan** (**UBA**) which was adopted by Ministry of Education, GOI in Nov 2014 and launched a nationwide program for Higher Educational institute to participate and adopt a cluster of villages around them and work for their development in collaboration with district administration. Presently **he is the national coordinator of *Unnat Bharat Abhiyan*, for a paradigm shift in academic and research environment in the country to make it more inclusive and societal relevant.** The action verticals of UBA making a developmental impact are organic agriculture, water management, rural energy systems, rural craft and industries, sanitation, health care, housing, basic amenities, e-governance etc. By July 2019, UBA is operating in 2142 Participating Institute with nearly 11000 adopted villages and plans to cover 7500 institutes across India to cover nearly 40000 villages in next two years.

Apart from his wide knowledge on teaching on rural energy systems through alternate fuels he is best known for the design and development of small scale biogas purification Bio-CNG and bottling technology for vehicular application in India. The technology has been licensed by IIT Delhi to 9 industries, many Gaushalas and young entrepreneurs for field implementation. He proposed Bio-CNG way back in 2002 and the research team led by him is working on the technology development since then. He received an Indian patent on the Process for Preparing

Fuel from Biogas and a Device for the same Indian patent Application No. 161-DEL-2006 dated 20.1.2006 granted Patent no. 284588, on June 27, 2017.

Prof. Vijay has been sanctioned a project and a car to test engine performance, emissions, mileage, cylinder deterioration on Bio-CNG produced at IIT Delhi from waste. IIT Delhi is operating Indias first and only biogas car for last 9 years which has crossed more than 80000 km on biogas. Based on the data on performance of engines, emission derating and degradation on use of upgraded biogas in the car and its experience, Bureau of Indian Standards has formulated biomethane bio-CNG standard in India in 2013 -IS 16087. His efforts in developing Bio-CNG technology in India is now yielding results and MNRE is running a scheme on it as well as Government of India has announced Bio-CNG as a major component in National Bio-Fuels Policy 2018 which will reduce import of petroleum crude, help in enhancing farmers and rural economy and protect our environment. Launch of Sustainable Alternative towards affordable Transportation (SATAT) was another millstone step for promotion of compressed biogas promotion in india.

Prof Vijay also developed a mobile unit of biogas purification and bottling plant mounted on four wheeled trolley operated by a tractor sponsored by MNRE. The developed mobile unit can easily be transported at biogas plants sites situated in and around villages to purify biogas and store it into cylinders which can easily be dispensed into vehicles. This developed system enhances the business model of biogas for its commercialization. At large, the system is able to remove the limitations of utilizing biogas at a point of generation, improve local economy and provide employment opportunities in rural areas.

Prof. Vijay also founded a technical movement as Biogas Forum India to promote and popularize biogas and bio-fertilizer in India. Presently he is serving as General Secretary of the aforesaid Forum. He is Fellow of ISAE and Institution of Engineers (India), International Association of Advanced Materials (IAAM, Sweden) and life member of ISCA, ISTE, SESI and other scientific and professional societies/bodies. He has delivered more than 100 invited lectures in many programs, conferences, courses etc.

He is also Convener of National Steering Committee for an inter-Ministerial programme Scientific Utilization through Research Augmentation- Prime Products -Panchagavya from Indigenous Cows - SUTRA-PIC up India led by Ministry of Science and Technology and helping development of cow based economy in rural areas chaired by Dr Harshvardhan, then Hon Minister S&T, Govt of India.

Prof. Vijay has about 175 publications in journals and conferences, 7 books and one lab manual to his credit. Prof. Vijay received more than 21 awards for his outstanding contribution in research, teaching and extension at local and national level.

SIGNIFICANT CONTRIBUTION OF THE NOMINEE / APPLICANT

His significant contribution to our country is giving a format to the government to link higher knowledge institutes to rural areas and society through concept and vision of **Unnat Bharat Abhiyan**, which is now a flagship program of MoE under his national coordination. He is also

Convener for an inter-Ministerial programme Scientific Utilization through Research Augmentation- Prime Products Panchagavya from Indigenous Cows NSC led Dr Harshvardhan then Hon. Minister of Science and Technology,

Prof Vijay has been a pioneer for Bio CNG technology development in India. Due to his efforts and development in biogas upgradation technology, Ministry of New and Renewable Energy had launched a scheme in 2009 Biogas Fertilizer Plant BGFP to promote commercial demonstration of harnessing all organic resources in rural areas for biogas generation, upgradation and bio fertilizer in entrepreneurial mode across India. Prof. Vijay has been dedicatedly sharing his time and expertise for technical backup and hand holder of these entrepreneurs. 18 no of projects were sanctioned in 7 states by 2010. In the year 2011 it was converted into a full program by MNRE.

Also he developed a concept of rural industrial estate which can make rural areas self reliant in income generation of rural masses and generate employment for them and Gram Urja Swaraj for sustainable energy supply using locally available resources.

National Level Awards

Gold Medal Awarded on M.E. Examination by the Rajasthan Agricultural University. 1990

ISAE Team Research Award, New Delhi 1999

District Level Award on Republic Day Parade by the District Collector of Udaipur 2001

Special Award by the Vice-Chancellor, MPUAT, Udaipur on Excellent Achievement by a Faculty in the University 2001

First Prize for Original Book Writing in Hindi in the Scheme of **Prakrit Urja Purskar Yojana** by the Ministry of Non-Conventional Energy Sources, Govt. of India on the Book Titled **Biogas Vigyan Avam Upyog.**

Young Scientist Award by National Academy of Agricultural Sciences, New Delhi for Contribution in Agricultural Engineering 2000

Hari Om Ashram Prerit Young Scientist Award 1998 for Outstanding Research Work during 1994 97 in the Area of Renewable Energy by Sardar Patel Renewable Energy Research Institute, VallabhVidhya Nagar

Career Award to Young Teachers by All India Council for Technical Education AICTE, GOI New Delhi 1999 2002

Prakriti National Prize and Award 2005 Applications of S T for Self Reliance in Rural Economy by Prakriti Bharti

AICTE Takniki Pathya Pustak Yojana 2003-04 Third Prize Jointly on Book Urja Paristhitiki Vigyan Avam Paryavaran

Prof. Yashwant Rao Kelkar Award 1992 for Excellent Work in the Field of Appropriate Technology for Rural Development Constituted by Akhil Bhartiya Vidhyarthi Parishad on all India Level.

Second Prize for Original Book Writing in Hindi on Subjects Related to Environment Titled Pryavaran Sikhsa by the Ministry of Environment and Forest, Govt. of India.1993

SGSTIS National Award for Young Engineering Teacher by Indian Society for Technical Education, New Delhi 1999

"Shiksha Gaurav" Award to Prof. V K Vijay at Global Nature Film Festival, by "Vishwa Mitra Parivar" at National Bal Bhavan

Pt. Deen Dayal Upadhyaya Recognition for Reengineering India by re:think India.

International Level Awards

IAAM (IAAM, over 50k members from over 100 countries, a principle organization in the field of Advanced Materials) Scientist Award for the year 2019, Viking Line Cruise, Stockholm, Sweden.

IMPACT OF THE WORK DONE BY THE NOMINEE / APPLICANT

The idea of linking higher education institutes to rural development was brainchild by Prof Vijay and based on the merit of the idea, the MoE adopted it as a national programme as Unnat Bharat Abhiyan. This has rolled out village development as a social responsibility of every institute. Presently, it has taken the shape of a mass movement for rural development in India. Prof Vijays deep understanding and commitment for developing all aspects of rural energy sector have also helped to start GOBAR DHAN scheme by Ministry of Drinking Water and Sanitation where IIT Delhi is the lead technical support agency.

Prof Vijay s work on biogas enrichment and bottling system Bio CNG is the most significant and commendable work of the nominee addressing the challenges of energy, fuels, biodiversity, rural development and enhancing farmers income. Many gaushals and entrepreneurs are running Bio CNG plants. Prof Vijay significantly contributes towards rural energy sector and rural employment generation through his association with field agencies. Through his dedicated efforts, Prof Vijay and MNRE developed a scheme of Biogas Fertilization Plant which not only encouraged the use of Biogas but also generated awareness among masses about bio fertilizer through biogas plant residues. IOCL, Punjab and Haryana governments are taking his help in producing bio-CNG from rice straw to reduce its field burning and air pollution. This has initiated promotion of organic agriculture.

Contribution to the Society

His contribution to link higher academic institutes to villages and society is a major paradigm shift in higher education through Unnat Bharat Abhiyan. He is also a pioneer in cow based rural economy development and Panchgavya validation adopted by Ministry of Science and Technology. He is also technically supporting GOBAR DHAN Galvanising Organic Bio Agro Residue scheme as a lead of Ministry of Drinking Water and Sanitation for Swachh Bharat Mission.

Application of his technologies aims to create rural entrepreneurs who can take up the work of rural energy security by dung collection, gas generation, biogas enrichment and bottling, supply of biomethane for vehicles and enriched organic manure for organic farming. IIT Delhi is supporting for technical back up, hand-holding and monitoring of every project in BGFP.

To scale up the technologies developed by him, he has been backstopping both rural, urban and enterprises like Mahindra and Mahindra, Praj Industries and other companies for promoting bioCNG in India. It will reduce petroleum import, enhance farmers' income and improve environment.

Prof Vijay shares the Prime Ministers dream of New India through **Gram Urja Swaraj** indicating Village development through energy self-reliance using locally available resources. He has successfully converted his ideas into national programmes with the aim of reducing the urban-rural divide, economic disparity and resource re appropriation.